REMARKS

Claims 1 to 20 are pending in the application. The disclosure has been objected to for using attorney docket numbers instead of application numbers. Claims 1 to 5, 8 to 13, and 17 to 20 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Malhotra et al. (U.S. Patent 5,931,995) in view of Siddiqui (U.S. Patent 5,939,468) and Watt (U.S. Patent 4,105,806). Claims 6 and 16 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Malhotra et al. in view of Siddiqui and Watt and further in view of Tobias et al. (U.S. Patent 5,286,288). Claim 7 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Malhotra et al. in view of Siddiqui and Watt and further in view of Nishizaki et al. (U.S. Patent 6,022,910). Claims 14 and 15 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Malhotra et al. in view of Siddiqui and Watt and further in view of Shacklette (U.S. Patent 5,378,403) and WO 93/22775.

With respect to the objection to the disclosure, Applicant has amended the specification as indicated to replace Attorney Docket Numbers with U.S. Application Serial Numbers, thereby eliminating this basis for objection.

Applicant respectfully traverses the rejections of the claims. The present invention is directed to a hot melt ink composition comprising (a) an aldehyde copolymer ink vehicle, (b) a nonpolymeric aldehyde viscosity modifier, (c) a colorant, (d) an optional conductivity enhancing agent, (e) an optional antioxidant, and (f) an optional UV absorber.

The Examiner has rejected claims 1 to 5, 8 to 13, and 17 to 20 under §103 as being unpatentable over Malhotra et al. in view of Siddiqui and Watt.

Malhotra et al. discloses an ink comprising (1) a liquid aldehyde, a liquid acid, or mixtures thereof, (2) a solid additive aldehyde compound, a solid additive acid compound, or mixtures thereof, (3) a lightfastness UV absorber, (4) a lightfastness antioxidant, and (5) a colorant.

Siddiqui discloses jet ink compositions suitable for producing marks on objects that are invisible to the unaided eye and are visible only when excited by an exciting radiation comprising a solvent, a fluorescent colorant, a binder resin, and a plasticizer having a vapor pressure of about 15 mm Hg or less at 240°C. Examples of suitable binder resins include an acrylic resin, a toluenesulfonamide resin, and a sulfonamide-formaldehyde resin. An example of a suitable plasticizer is o-butyl benzyl phthalate. The marks are blush resistant when exposed to water at 150°F and above for 5 minutes. Also disclosed is an improved method of identifying objects, the improvement comprising providing a blush resistant identifying mark using the inventive jet ink compositions. A system for identifying objects with a blush resistant identification mark is also disclosed.

Watt discloses photoinitiator-free inks and a method of producing printed and varnished surfaces by depositing a base film or printing on a substrate and depositing, wet-on-wet, a protective varnish or top coat after which the multilayers are exposed to an energy source,

preferably to electromagnetic radiation, to cure simultaneously the varnish and ink on said substrate.

The Examiner has stated that Malhotra et al. discloses a hot melt ink possessing melting temperature of 125 to 160°C, melt viscosity of 5 to 20 centipoise, and acoustic loss value of less than 100 decibels per millimeter, that this ink contains colorant such as a dye or pigment, 0.5 to 10 percent antioxidant, and UV absorber, that the reference also discloses an acoustic ink jet printing process, that the reference discloses the use of 1 to 55 percent compounds such as benzaldehyde, 3-methoxy benzaldehyde, 4-methoxy benzaldehyde, 3-methyl benzaldehyde, 2-hydroxy benzaldehyde, cinnamaldehyde, and 5 to 97 percent compounds such as 2,3,4-trimethoxybenzaldehyde, 3,5-dimethoxy benzaldehyde, 2,5-dimethoxy benzaldehyde, and 3-benzyloxy benzaldehyde, that while Malhotra et al. discloses 2,3,4-trimethoxybenzaldehyde, 2-hydroxy benzaldehyde, and 3-benzyloxy benzaldehyde, the present claims require either 2,3,5-trimethoxybenzaldehyde, 2,3,6-trimethoxybenzaldehyde, 2,4,5-trimethoxybenzaldehyde, 2,4,6-trimethoxybenzaldehyde, 3-hydroxy benzaldehyde, 4-hydroxy benzaldehyde, or 4-benzyloxy benzaldehyde, that in each case, the only difference between the reference compounds and those presently claimed are the position of the substituents, i.e., ortho, meta, or para, that absent any evidence of criticality, one of ordinary skill in the art would expect the benzaldehyde to function in the same manner regardless of the position of the substituents, and that Malhotra et al. broadly discloses the use of benzaldehydes and 3-methoxy benzaldehyde while the present claims

require more specific types of benzaldehydes such as 4-hydroxy-3-methoxy benzaldehyde, but that one of ordinary skill in the art would have recognized that the broad disclosure of benzaldehyde or 30methoxy benzaldehyde encompasses the use of specific types of these compounds such as those presently claimed, and that the choice of these specific types of compounds would have been within the bounds of routine experimentation.

Applicant is assuming that the Examiner's comments regarding specific aldehyde compounds refer to claim 10, since this claim is the only one in the present application that recites specific nonpolymeric aldehydes. Applicant points out that Malhotra et al. is directed to an ink containing both a liquid aldehyde or acid and a solid aldehyde or acid in addition to the other disclosed ink components, and that most of the compounds referred to by the Examiner, namely benzaldehyde, 3-methoxy benzaldehyde, 4-methoxy benzaldehyde, 3-methyl benzaldehyde, 2-hydroxy benzaldehyde, and trans-cinnamaldehyde, are disclosed in Malhotra et al. as examples of liquid aldehydes, and that 2,3,4-trimethoxybenzaldehyde, 3,5-dimethoxy benzaldehyde, 2,5-dimethoxy benzaldehyde, and 3-benzyloxy benzaldehyde are disclosed in Malhotra et al. as examples of solid aldehydes. In contrast, the materials recited in claim 10 are all solids at room temperature; more specifically:

3-hydroxy benzaldehyde: 103-105°C

4-hydroxy benzaldehyde: 117-119°C

4-benzyloxy benzaldehyde: 72.5-74°C

2-carboxy benzaldehyde: 96-98°C

4-nitro benzaldehyde: 105-108°C

2,3-dihydroxy benzaldehyde: 108-110°C

2,5-dihydroxy benzaldehyde: 100-103°C

3-hydroxy-4-methoxy benzaldehyde: 113-115°C

4-hydroxy-3-methoxy benzaldehyde: 81-83°C

4-hydroxy-3-ethoxy benzaldehyde: 76-78°C

4-hydroxy-3-methyl benzaldehyde: 118-120°C

2-hydroxy-5-nitrobenzaldehyde: 128-130°C

3-hydroxy-4-nitrobenzaldehyde: 132-134°C

4-hydroxy-3-nitrobenzaldehyde: 140-142°C

3,4-dibenzyloxy benzaldehyde: 91-94°C

3,5-dibenzyloxy benzaldehyde: 78-80°C

4-acetoxy-3,5-dimethoxy benzaldehyde: 115-117°C

2-amino-3,5-dibromo benzaldehyde: 130-135°C

2-benzyloxy-4,5-dimethoxy benzaldehyde: 138-141°C

5-bromo-2-hydroxy-3-methoxy benzaldehyde: 125-127°C

4-hydroxy-3,5-dimethoxy benzaldehyde: 110-113°C

2,3,5-trichlorobenzaldehyde: 73-75°C

2,3,6-trichlorobenzaldehyde: 87-89°C

2,4,5-trimethoxy benzaldehyde: 112-114°C

2,4,6-trimethoxy benzaldehyde: 118-120°C

3,5-dichloro-2-hydroxy-benzaldehyde: 95-97°C

3,5-dibromo-2-hydroxy-benzaldehyde: 82-83.5°C

3,5-diiodo-2-hydroxy-benzaldehyde: 109-110°C

3,4-dihydroxy-5-methoxy benzaldehyde: 131-134°C

3,5-dimethyl-4-hydroxy benzaldehyde: 112-114°C

2,6-dimethoxybenzaldehyde: 96-98°C

2-nitro cinnamaldehyde: 127-129°C

4-(diethylamino) cinnamaldehyde: 74-76°C

4-acetoxy-3-methoxy cinnamaldehyde: 97-100°C

4-hydroxy-3-methoxy cinnamaldehyde: 80-82°C

2-hydroxy-1-naphthaldehyde: 82-85°C

2-methoxy-1-naphthaldehyde: 82-85°C

9-anthraldehyde: 104-105°C

5-bromo-2-furaldehyde: 82-85°C

5-nitro-2-thiophene carboxaldehyde: 75-77°C

9-ethyl-3-carbazole carboxaldehyde: 85-87°C

4-stilbene carboxaldehyde: 112-114°C

2-hydroxy-5-methyl-1,3-benzene dicarboxaldehyde: 128-130°C

terephthal dicarboxaldehyde: 115-116°C

2-(diphenylphosphino) benzaldehyde: 112-115°C

1-(phenylsulfonyl)-2-pyrrolecarboxaldehyde: 81-82°C

1-pyrene carboxaldehyde: 123-126°C

phenanthrene carboxaldehyde: 100-103°C

2-fluorenecarboxaldehyde: 85-86°C

Accordingly, this reference cannot be said fairly to teach or suggest the use of the materials recited in claim 10 in an ink according to the present invention, which also contains an aldehyde copolymer ink vehicle.

The Examiner has stated that the difference between Malhotra et al. and the present claimed invention is the requirement in the claims of (a) viscosity modifier, (b) aldehyde copolymer, and (c) time necessary for ink to change from solid to liquid.

With respect to difference (a), the Examiner has stated that Malhotra et al. discloses benzaldehyde compounds as presently claimed but does not explicitly refer to these compounds as viscosity

modifiers, but that given that the reference compounds are the same type as the compounds presently claimed, i.e., benzaldehydes, it would have been natural for one of ordinary skill in the art to infer that the reference compounds intrinsically function as viscosity modifiers, and thereby arrive at the claimed invention.

Applicant disagrees with this position. As stated in the instant application, the viscosity modifier generally acts to lower the viscosity of the ink at the jetting temperature, typically lowering the viscosity by from about 10 to about 20 centipoise compared to a similar composition containing no viscosity modifier, although the quantitative viscosity adjustment can be outside of this range. Nothing in Malhotra et al. teaches or suggests to one of ordinary skill in the art that nonpolymeric aldehyde compounds would function as viscosity modifiers in ink compositions containing an aldehyde copolymer ink vehicle. Accordingly, Applicant is of the position that the present invention is patentable with respect to this reference.

With respect to difference (b), the Examiner has stated that Siddiqui, which is drawn to ink jet inks, discloses the use of 12 to 35 percent toluenesulfonamide-formaldehyde resin to improve the adhesion of the ink to the substrate, and that in light of the motivation for using aldehyde copolymers disclosed by Siddiqui, it would have been obvious to one of ordinary skill in the art to use this copolymer in the ink composition of Malhotra et al. to produce an ink with improved adhesion to the substrate, thereby arriving at the claimed invention.

Applicant disagrees with this position. Siddiqui is directed to a liquid ink jet ink composition, with a viscosity of from about

1.6 to about 7.0 centipoise at 25°C. Nothing in this reference teaches or fairly suggests to one of ordinary skill in the art that a toluenesulfonamide-formaldehyde resin should be used as the vehicle in a solid, or hot melt, or phase change ink, or that a hot melt ink comprising a toluenesulfonamide-formaldehyde resin in combination with a nonpolymeric aldehyde viscosity modifier and a colorant would be desirable. Accordingly, Applicant is of the position that this reference, viewed either alone or in combination with Malhotra et al., fails to render obvious the present invention as recited in claims 1 to 5, 8 to 13, and 17 to 20.

Further with respect to difference (b), the Examiner has stated that Watt, which is drawn to ink compositions, discloses the use of polyglycidyl ethers of formaldehyde as a binder, and that in light of the motivation for using aldehyde copolymers disclosed by Watt, it would have been obvious to one of ordinary skill in the art to use this copolymer in the ink composition of Malhotra et al. to produce an ink with improved adhesion to the substrate, thereby arriving at the claimed invention.

Applicant disagrees with this position. Watt is directed to a curable ink composition which is applied along with a protective varnish or top coat in a wet-on-wet deposition process. Nothing in this reference teaches or fairly suggests to one of ordinary skill in the art that a polyglycidyl ether of formaldehyde should be used as the vehicle in a solid, or hot melt, or phase change ink, or that a hot melt ink comprising a polyglycidyl ether of formaldehyde in combination with a nonpolymeric aldehyde viscosity modifier and a colorant would be desirable. Accordingly, Applicant is of the position that this reference,

viewed either alone or in combination with Malhotra et al., fails to render obvious the present invention as recited in claims 1 to 5, 8 to 13, and 17 to 20.

With respect to difference (c), the Examiner has stated that although there is no explicit disclosure of the time required to change the ink from a solid state to a liquid state, given that the melting temperature of Malhotra et al.'s ink overlaps the melting temperature presently claimed, it is natural to infer that Malhotra et al.'s ink will intrinsically change from solid to liquid in the same amount of time as presently claimed.

Applicant disagrees with this position. The melting point of a substance and the amount of time required for that substance to change from a solid to a liquid at the melting point are two entirely different characteristics of the substance. Nothing in Malhotra et al. teaches or suggests a hot melt ink that undergoes, upon heating, a change from a solid state to a liquid state in a period of no more than about 100 milliseconds. Accordingly, Applicant is of the position that claim 4 is particularly in condition for allowance with respect to this reference.

The Examiner has also rejected claims 6 and 16 under §103 as being unpatentable over Malhotra et al. in view of Siddiqui and Watt and further in view of Tobias et al. Tobias et al. discloses a hot melt ink composition for use in continuous ink jet printing comprising an electrolyte, an electrolyte-solvating and dissociating compound, and an image-forming agent, said ink being solid at about 25°C, said ink liquefying at a temperature between 75°C and 175°C, and said ink in the

liquid stage having a conductivity of greater than about 100 microsiemens/cm.

The Examiner has stated that the difference between Malhotra et al. in view of Siddiqui and Watt and the present claimed invention is the requirement in the claims of conductivity and the amount of conductivity enhancing agent, that Tobias et al., which is drawn to hot melt inks, discloses the use of 0.1 to 5 percent conductivity agents to control the conductivity of the ink from 500 to 1500 microsiemens per centimeter or approximately 8.7 to 9.2 log(picomho/cm), which ensures that the ink has sufficient conductivity to be ink jet printed successfully, and that it therefore would have been obvious to one of ordinary skill in the art to control the conductivity of the hot melt of Malhotra et al. via conductivity agents to produce an ink suitable for ink jet printing, thereby arriving at the claimed invention.

Applicant disagrees with this position. As stated hereinabove with respect to the rejection of claims 1 to 5, 8 to 13, and 17 to 20 under §103 as unpatentable over Malhotra in view of Siddiqui and Watt, this combination of references fails to teach or fairly to suggest to one of ordinary skill in the art an ink composition comprising an aldehyde copolymer ink vehicle, a nonpolymeric aldehyde viscosity modifier, and a colorant. Tobias et al. teaches a hot melt ink containing an electrolyte and an electrolyte solvating and dissociating compound for use in continuous ink jet printing. One of ordinary skill in the art, upon viewing these references in combination, would not be led to arrive at a hot melt ink composition comprising (a) an aldehyde copolymer ink vehicle, (b) a nonpolymeric aldehyde viscosity modifier, (c) a colorant, (d) an optional

conductivity enhancing agent, (e) an optional antioxidant, and (f) an optional UV absorber. Accordingly, Applicant is of the position that the present invention as recited in claims 6 and 16 is patentable with respect to these references.

The Examiner has also rejected claim 7 under §103 as being unpatentable over Malhotra et al. in view of Siddiqui and Watt and further in view of Nishizaki et al. Nishizaki et al. discloses a hot melt solid ink composition comprising at least one polyamide and at least one terpene resin. The terpene resin is present in an amount of from 0.5 percent by weight to 15 percent by weight based on the total weight of the ink composition. This hot melt solid ink composition can be stable to heat upon recording using ink jet recording apparatus where ink is heated to melt at a temperature higher than ordinary temperature to make a record, and has a superior transparency and a superior adhesion to printing mediums.

The Examiner has stated that the difference between Malhotra et al. in view of Siddiqui and Watt and the present claimed invention is the requirement in the claims of the haze value of the ink, that given that Malhotra et al. in view of Siddiqui and Watt disclose an ink with similar ingredients to those presently claimed, it is natural to infer that the ink intrinsically possesses haze values as presently claimed, that Nishizaki et al., which is drawn to hot melt inks, discloses that hot melt inks having haze values of 0 to 30 exhibit superior light transmission properties, especially when printed on OHP sheets, and that in light of the disclosure of Nishizaki et al. it would have been within the skill level of one of ordinary skill in the art to vary the specific types and amounts of

ingredients present in the ink of Malhotra et al. to produce an ink having haze values of 0 to 30 to produce an ink with superior light transmission properties, thereby arriving at the claimed invention.

Applicant disagrees with this position. As stated hereinabove with respect to the rejection of claims 1 to 5, 8 to 13, and 17 to 20 under §103 as unpatentable over Malhotra in view of Siddiqui and Watt, this combination of references fails to teach or fairly to suggest to one of ordinary skill in the art an ink composition comprising an aldehyde copolymer ink vehicle, a nonpolymeric aldehyde viscosity modifier, and a colorant. Nishizaki et al. teaches a hot melt ink containing a polyamide resin and a terpene resin, and teaches that the ink has a haze of 0 to 30. One of ordinary skill in the art, upon viewing these references in combination, would not be led to arrive at a hot melt ink composition comprising (a) an aldehyde copolymer ink vehicle, (b) a nonpolymeric aldehyde viscosity modifier, (c) a colorant, (d) an optional conductivity enhancing agent, (e) an optional antioxidant, and (f) an optional UV absorber. Accordingly, Applicant is of the position that the present invention as recited in claim 7 is patentable with respect to these references.

The Examiner has rejected claims 14 and 15 under 35 U.S.C. §103 as being unpatentable over Malhotra et al. in view of Siddiqui and Watt and further in view of Shacklette and WO 93/22775.

Shacklette discloses a thermally stable electrically conductive conjugated polymer comprising a conjugated polymer cation such as a substituted or unsubstituted polyaniline doped with a dopant anion substituted with one or more polar groups such as hydroxy,

the polar group having an electronegativity or an electropositivity such that said polar group or groups have a net polar group molar contribution greater than zero.

WO 93/22775 discloses a thermally stable electrically conductive polyaniline comprising a polyaniline homopolymer or copolymer doped with an organic phosphorus acid.

The Examiner has stated that the difference between Malhotra et al. in view of Siddiqui and Watt and the present claimed invention is the requirement in the claims of specific type of conductivity enhancing agent, that Shacklette discloses the use of polyaniline complexes with phosphonic or phosphinic acid to impart conductivity and enhanced thermal stability to polymers including formaldehyde-sulfonamide, that although there is no explicit disclosure that the complex is suitable for use in inks, it is well known in the art as found in state of the art references such as WO 93/22775 that these polyaniline-phosphorus-containing acid complexes are suitable for use in inks, and that in light of the motivation for using specific type of conductivity enhancing agent disclosed by Shacklette and WO 93/22775, it would have been obvious to one of ordinary skill in the art to use this conductivity enhancing agent in the ink of Malhotra et al. to control the conductivity of the ink so that the ink is successfully ink jet printed, thereby arriving at the claimed invention.

Applicant disagrees with this position. As stated hereinabove with respect to the rejection of claims 1 to 5, 8 to 13, and 17 to 20 under §103 as unpatentable over Malhotra in view of Siddiqui and Watt, this combination of references fails to teach or fairly to suggest to

one of ordinary skill in the art an ink composition comprising an aldehyde copolymer ink vehicle, a nonpolymeric aldehyde viscosity modifier, and a colorant. Nothing in Shacklette or WO 93/22775, viewed in combination with these references, teaches or suggests such an ink, and nothing in Shacklette or WO 93/22775 teaches or suggests that complexes of a dianiline and a phosphorus-containing acid would be suitable conductivity-enhancing agents for such an ink. One of ordinary skill in the art, upon viewing these references in combination, would not be led to arrive at a hot melt ink composition comprising (a) an aldehyde copolymer ink vehicle, (b) a nonpolymeric aldehyde viscosity modifier, (c) a colorant, (d) an optional conductivity enhancing agent, (e) an optional antioxidant, and (f) an optional UV absorber. Accordingly, Applicant is of the position that the present invention as recited in claims 14 and 15 is patentable with respect to these references.

Applicant believes that the foregoing amendments and distinctions place the claims in condition for allowance, and accordingly respectfully requests reconsideration and withdrawal of all grounds for rejection.

In the event the Examiner considers personal contact advantageous to the disposition of this case, she is hereby authorized to call Applicant(s) attorney, Judith L. Byorick, at Telephone Number (716) 423-4564, Rochester, New York.

Respectfully submitted,

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